SB761
U7R62
no. 45

FOREST PEST MANAGEMENT

EFFECTS OF APPLICATION RATE AND TIMING OF ETHEPHON TREATMENTS ON ABSCISSION OF PONDEROSA PINE DWARF MISTLETOE -A STATUS REPORT-

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Technical Report R2-45

December 1989

Timber, Forest Pest and
Cooperative Forestry Management
Rocky Mountain Region
USDA Forest Service
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ACKNOWLEDGMENTS

The field assistance of Kevin Olmstead, Biological Technician, is greatly appreciated.

ABSTRACT

Evaluation of field tests of the plant growth regulator ethephon has shown that significant abscission of dwarf mistletoe shoots occurs within a few weeks after application. Tests conducted in the Black Forest north of Colorado Springs, Colorado in 1988 on ponderosa pine dwarf mistletoe showed abscission rates of 73 to 98 percent with mid-June, mid-July and mid-August applications at rates of 2200 and 2700 ppm of ethephon in water with a spreader-sticker.

Examination of trees the year following treatments showed abscission rates of 57 to 76 percent indicating that some growth of new shoots occurred during the year. It is expected that reapplications of the chemical will be necessary at some interval yet to be determined to prevent spread of the parasite if not combined with silvicultural treatment of infected trees.

INTRODUCTION

Recent interest in the plant growth regulator ethephon (2-chloroethylphosphonic acid) in causing abscission of dwarf mistletoe shoots has stimulated field tests to evaluate it's effectiveness. Past research on the black spruce (Arceuthobium pusillum) and lodgepole pine (A. americanum) dwarf mistletoes led to additional tests on other native dwarf mistletoes (see literature cited).

Along the Colorado Front Range, the ponderosa pine dwarf mistletoe (A. vaginatum) is common in ponderosa pine stands and high value trees in urban forested areas. The need for control strategies other than cutting and pruning infected trees has been sought for many years.

Ethephon can be used to cause the abscission of dwarf mistletoe shoots and fruits thus preventing spread of the parasite to adjacent healthy trees, especially in the understory. Also infected overstory trees that are periodically treated can be retained until the regeneration is established, thus providing a forested appearance. Eventual removal of infected overstory trees is recommended using this strategy.

At this time it is necessary to determine when the chemical is best applied and how long it is effective in reducing shoot and fruit production of the dwarf mistletoe. This study was designed to answer these questions.

During June, July and August 1988, treatments with the chemical were conducted in the Black Forest north of Colorado Springs, Colorado (Johnson, Hildebrand, Hawksworth, 1989). This forest is predominantly ponderosa pine with a high incidence of A. vaginatum. The forest also is mainly in private ownership and a great deal of concern exists on the condition and future of the resource. This report summarizes data collected in the summer of 1989, one year following treatment.

METHODS AND MATERIALS

A description of the study site and methods used for the study are contained in the report by Johnson, Hildebrand and Hawksworth, 1989.

Direct observation of previously tagged infections was made to determine the number of shoots on each infection. A photographic record was also made of selected individual infections.

RESULTS AND DISCUSSION

Data for each application date within treatments (June, July, August) were combined since there was little difference in numbers of shoots between treatment dates. Some loss of infected branches was observed over the winter due to breakage and girdling by rodents. An adjustment of the data base was made accordingly.

During the season of treatment, reduction in numbers of shoots ranged from 82 to 92 percent for infections treated at 2200 and 2700 ppm ethephon, respectively (Table 1). The year following treatment, numbers changed to 26, 57 and 76 percent for non-treated controls, 2200 and 2700 ppm, respectively.

The loss of shoots within the non-treated controls of 26 percent over the winter is due to natural abscission of shoots and feeding by insects as mentioned in the previous report. The apparent increase in numbers of shoots within the ethephon-treated infections can be explained by the emergence of new shoots. To our knowledge, ethephon has no systemic action and only external portions of the dwarf mistletoe are affected. This data appears to support this. Regrowth of treated infections will eventually result in the production of mature shoots and fruits and subsequent spread of the parasite. Applications of ethephon will need to be made at some interval yet to be determined for ponderosa pine unless silvicultural treatments are used to remove infected trees.

Additional evaluations of all applications are planned yearly until development of mature dwarf mistletoe fruit occurs.

Table 1. Percent changes in ponderosa pine dwarf mistletoe shoots (compared to before treatment) after treatment with ethephon, Black Forest, Colorado 1988-1989.

Treatment	Percent change in number of shoots	
	First year	Second year 1/
Non-treated Controls	0	-26
2200 ppm	-82	-57
2700 ppm	-92	-76

1/ Infections lost to various causes over the winter were removed from the analysis.

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